

**Small Angle Approximations Exam Questions**

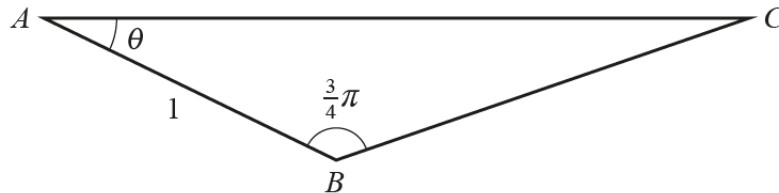
**Q1, (OCR H240/03, Sample Question Paper, Q4)**

Show that, for a small angle  $\theta$ , where  $\theta$  is in radians,

$$1 + \cos \theta - 3 \cos^2 \theta \approx -1 + \frac{5}{2} \theta^2$$

[4]

**Q2, (OCR H240/03, Practice Paper Set 1, Q3)**



The diagram shows triangle  $ABC$ , in which angle  $A = \theta$  radians, angle  $B = \frac{3}{4}\pi$  radians and  $AB = 1$  unit.

(i) Use the sine rule to show that  $AC = \frac{1}{\cos \theta - \sin \theta}$ . [3]

(ii) Given that  $\theta$  is a small angle, use the result in part (i) to show that

$$AC \approx 1 + p\theta + q\theta^2,$$

where  $p$  and  $q$  are constants to be determined.

[4]

**Q3, (OCR H240/02, Practice Paper Set 3, Q3)**

Use small angle approximations to estimate the solution of the equation  $\frac{\cos \frac{1}{2}\theta}{1 + \sin \theta} = 0.825$ , if  $\theta$  is small enough to neglect terms in  $\theta^3$  or above. [4]